

Refractive Errors among Northern Border University Medical Students

Alruwaili, Amal Muhaysin B¹, Turki Dkhallah Turki Alshamdin², Maram Khalf Ayad Alenzi¹,
Deema Faleh M Alanazi¹, Afnan Hamdan R Alshammari¹, Bashayer Khlaif Alruwaili¹

¹Faculty of Medicine, Northern Border University, Arar,

²Faculty of Medicine, Al-Jouf University, Al-Jouf, KSA

Corresponding Author: Alruwaili, Amal Muhaysin B, E-Mail: amaa1998@outlook.com, Phone: +966557704711

ABSTRACT

Background: Uncorrected refractive error is the most common cause of vision impairment worldwide, and the WHO identified uncorrected refractive error as one of the priorities for the program of Vision 2020. **Aim:** Aim of this study was to determine the prevalence of refractive errors (REs) among medical students of Northern Border University. **Subjects and Methods:** A cross-sectional study was conducted on 167 students. A structured close-ended questionnaire was distributed for data collection and checking REs amongst them in the period between December 2017 and January 2018. All volunteering participants underwent ophthalmic examination including autorefractometer examination. **Results:** Our study showed that 67.1% of participants suffered from REs. 53.9% had myopia, 6.6% hyperopia and 6.6% had astigmatism. 47.9% of cases of refractive errors have myopia, 5.4% hyperopia, 1.8% astigmatism, 4.2% have both myopia and astigmatism, 0.6% have both hyperopia and a stigmatism, 0.6% have all myopia, hyperopia and astigmatism. Both eyes were affected in 46.7% of cases, left eye was affected in 6.6% and right eye was affected in 7.2% of cases. **Conclusion:** the prevalence of REs among investigated students was 67.1%, which is one of the highest rates reported. There has to be a concern for a regular checkup starting from early ages as a preventive measure against REs through increasing knowledge, concerning REs particular for medical students as future health care professionals. **Keywords:** Refractive errors, Medical students, myopia, astigmatism, hypermetropia, Northern Border University, Arar, KSA.

INTRODUCTION

Refractive error may be defined as a state in which the optical system of the non-accommodating eye fails to bring parallel rays of light to focus on the retina⁽¹⁾. Uncorrected refractive error (URE) is the most common cause of vision impairment and the secondary cause of blindness worldwide. It has been estimated that URE accounts for 153 million individuals of visual impairment globally, and the WHO identified URE as one of the priorities for the program of Vision 2020⁽²⁾. According to the WHO report, uncorrected refractive error is the second commonest cause of global visual impairment first being the cataract⁽³⁾. URE is associated with limitations in vision-related tasks and decreased quality of life^(4,5). Myopia is the most common type of RE, a complex trait including both environmental and genetic factors⁽⁶⁾. Medical students are a group of young adults who spend prolonged periods of time on reading and close-up work. They are a select population with a high level of education as well as above average intelligence. With their intensive study regimen that spans many years, medical students have been reported to be at high risk for myopia⁽⁷⁾. The correlation between myopia and high education levels was settled long time ago. In European cohort, Mirshahi⁽⁸⁾ showed that individuals with higher level of education are more likely to be myopic. A previous study in Al-jouf University among medical students reported that;

83.1% of participants suffered from REs. 74.129% were myopic, while 53.731% were astigmatic, and 47.264% had combined astigmatism and myopia⁽⁹⁾.

Another study in Nigeria found that sixty-six (79.5%) of subjects had a form of refractive error; 63.6%, 16.7% and 19.7% were myope, hyperope or simple stigmata, respectively. The prevalence of ametropia was 82% in female and 78% in males. Eight students (12.1%) were wearing glasses at the time of the study⁽¹⁰⁾.

The aim of this study is to determine the prevalence of refractive errors in medical students, Northern Border University.

SUBJECTS AND METHODS

Research design: This is a community-based cross-sectional study

Research environment: Data was collected from representative sample of undergraduate medical students, Faculty of Medicine, Northern Border University, Arar, Kingdom of Saudi Arabia. The study period was from October 2017 to June 2018.

A structured close-ended questionnaire was distributed to the targeted population to collect demographic data and history of REs.

Inclusion criteria: Willingly participating medical students of both genders attending the College of Medicine, Northern Border University, Arar, Kingdom of Saudi Arabia.

Exclusion criteria: Unwilling participants and those unavailable for any reason during the study

period. Autorefractometer (Topcon RM-8000B, Topcon Co., Tokyo, Japan) was used to check both eyes of each participant with the help of an experienced ophthalmology consultant. Refraction data were recorded as follows: An initial objective refraction result was recorded as the average of sex reading for each eye, then, subjective refraction was attempted to refine vision, using the results of the objective refraction as a starting point. Because of the age of our study population, no cyclopegia was used. We defined myopia as spherical equivalent (SE) of at least -0.05 diopter (D) in either eye, hypermetropia was defined as spherical equivalent (SE) of at least +0.05 diopter (D) in either eye, and astigmatism was defined as cylindrical equivalent (CE) of at least -0.05 diopter (D) in any axis.

Ethical considerations

This study was reviewed by staff members of faculty of Medicine, Northern Border University. Participants were informed that participation is completely voluntary. No names were recorded on the questionnaires. All questionnaires kept safe.

Statistical treatment

Descriptive statistics and testing of hypothesis were used for the analysis. The data was analyzed using SPSS V.16.0 (SPSS Inc; Chicago, IL, USA). The Chi-square test was used to examine

the association between different variables. $P < 0.05$ was considered as statistically significant.

RESULTS

Table (1): illustrate sex and errors of refraction related variables among the studied students. Participant students were 77.8% were females and 22.2% were males. 23.4% of students had family history of errors in both mother and father, 23.4% in father and 9.6% in mothers. 46.7% of studied students wear glasses, 36.5% suffer from blurred vision without glasses, 3% had problems in color differentiation, 53.9% had myopia, 6.6% hyperopia and 6.6% had astigmatism.

Table (2): shows classification of the students according to the type of error of refraction they have. 47.9% of cases of refractive errors have myopia, 5.4% hyperopia, 1.8% astigmatism, 4.2% have both myopia and astigmatism, 0.6% have both hyperopia and astigmatism, 0.6% have all myopia, hyperopia and astigmatism. Both eyes were affected in 46.7% of cases, left eye was affected in 6.6% and right eye was affected in 7.2% of cases.

Table (3): shows the relationship between type of error, affected eye with errors of refraction and sex of the medical students. There was no significant correlation between sex and types of errors ($P=0.53$) or between sex and the affected eye ($P=0.185$).

Table (1): Sex and errors of refraction related variables among the studied students, NBU, 2017 (N=167)

		No.	%
Sex	• Female	130	77.8
	• Male	37	22.2
Family History of Error	Total	94	56.3
	a) Both mother and father	39	23.4
	b) Father	39	23.4
	c) Mother	16	9.6
	No family history of Error	73	43.7
Wearing glasses	• No	89	53.3
	• Yes	78	46.7
Blurred vision without glasses	• No	106	63.5
	• Yes	61	36.5
Colors differentiation	• No	162	97
	• Yes	5	3
Period of Error (in years)	• 1-2	36	21.6
	• 3-4	32	19.2
	• 5+	33	19.8
	• No error	66	39.5
Prevalence of refractive error	• Yes	112	67.1
	• No	55	32.9
Myopia	• Yes	90	53.9
	• No	77	46.1
Hyperopia	• Yes	11	6.6
	• No	156	93.4
Astigmatism	• Yes	11	6.6
	• No	156	93.4

Table (2): Classification of the students according to the type of error of refraction they have

Errors of refraction	No.	%
• Myopia	80	47.9
• Hyperopia	9	5.4
• Astigmatism	3	1.8
• Myopia and Astigmatism	7	4.2
• Hyperopia and Astigmatism	1	.6
• Myopia, Hyperopia and Astigmatism	1	.6
• No error	66	39.5
Affected eye with errors of refraction		
• Both eyes	78	46.7
• Left eye	11	6.6
• Right eye	12	7.2
No error	66	39.5
Total	167	100.0

Table (3): The relationship between type of error, Affected eye with errors of refraction and sex of the medical students, NBU, 2018

Error of refraction	Sex		Total (n=167)	P value
	Female (n=130)	Male (n=37)		
Myopia	61	19	80	0.53
	46.9%	51.4%	47.9%	
Hyperopia	7	2	9	
	5.4%	5.4%	5.4%	
Astigmatism	3	0	3	
	2.3%	.0%	1.8%	
No error	52	14	66	
	40.0%	37.8%	39.5%	
Myopia and astigmatism	6	1	7	
	4.6%	2.7%	4.2%	
Hyperopia and astigmatism	0	1	1	
	.0%	2.7%	.6%	
Myopia, Hyperopia and astigmatism	1	0	1	
	.8%	.0%	.6%	
Affected eye with errors of refraction				
Both eyes	61	17	78	0.185
	46.9%	45.9%	46.7%	
Left eye	6	5	11	
	4.6%	13.5%	6.6%	
Right eye	11	1	12	
	8.5%	2.7%	7.2%	
No error	52	14	66	
	40.0%	37.8%	39.5%	

DISCUSSION

Refractive error (RE) is a condition in which the optical system of the non-accommodating eyes unable to bring parallel rays of light to focus on the retina ⁽¹¹⁾. WHO estimates that Refractive errors are a major cause of blindness in the world leading to 42% cases of visual impairment ⁽¹²⁾. 27.1 million persons in the 16-39

year age group suffer from visual impairment due to refractive errors ⁽¹³⁾. This is a cross sectional study conducted among 167 of the studied students, NBU, 2017 Saudi Arabia.

Our study found that 101 (60.4%) of the students had errors of refraction and 66 (39.5%) had no error. According to type of errors our study reported myopia was the most common by 47.9%,

hyperopia 5.4%, astigmatism 1.8%, myopia and astigmatism 4.2%, hyperopia and astigmatism 0.6%. In Saudi Arabia across sectional study involved 504 medical students selected from two medical colleges from (Hail University and Prince Sattam University) 454 of them were examined for the presence of myopia or hypermetropia, myopia was detected in 243/454(53.5%) hypermetropia was defined in 9/454(2%)⁽¹⁴⁾. Other studies from KSA in this context are very few and most of them dealt with children. In a study conducted to identify the prevalence and pattern of refractive errors among 1319 of the school-entrant children, 60 children were diagnosed as having one or more refractive error, with an over-all prevalence of 4.5%; prevalence of different refractive errors were as follows; Myopia (2.5%), hyperopia (2.1%), astigmatism (2.5%)⁽¹⁵⁾. Another study from KSA, has examined 2246 Saudi primary school children aged 6 to 14 years of both genders; the study found that myopia was the most frequently met refractive error among both genders (65.7% of the total errors encountered)⁽¹⁶⁾. Another cross-sectional survey conducted in KSA included 21 primary schools with of 5176 children (mean age 9.5±1.8 years), the inclusive prevalence of (RE) was 18.6%, and astigmatism and myopia were the most common refractive error⁽¹⁷⁾. In Qassim university, KSA; a cross sectional study conducted among 223 of all medical and pharmacy female students found that (72.2%) of students were designated to have a form of refractive error, myopia represented 61.5%⁽¹⁸⁾. In Malaysia across sectional study carried out among 425 medical students in AIMST University; out of 425 medical students, 137 (32.24%) were found to have refractive errors, of the 137 students, 120 (87.6%) had myopia, 10 (7.3%) had hypermetropia and the rest 7 (5.1%) had simple astigmatism⁽¹⁹⁾.

In India across sectional study conducted among 244 medical students of a tertiary care teaching hospital, the prevalence of uncorrected REs was 26.23%; myopia, astigmatism, and hypermetropia was 87.50%, 9.38%, and 3.12%, respectively⁽²⁰⁾. A cross-sectional study conducted among all the students of MKCG Medical College, Berhampur, Odisha, India; out of the 506 subjects analyzed prevalence of Corrected Refractive Errors was 49.6%, the most common refractive error prevalent was Myopia (54.5%) followed by combined myopia and astigmatism (31.3%), hypermetropia (8.6%) and astigmatism (5.6%)⁽²¹⁾. In Nigeria, Study involved 83 medical students from the University of Calabar Medical School reported Sixty-six (79.5%) of subjects had a form

of refractive error; 63.6%, 16.7% and 19.7% were myopic, hyperopic or simple astigmatic, respectively⁽¹⁰⁾. Many studies carried out to estimate the prevalence of myopia as the most common type of refractive errors. In study conducted among (202) of MBBS students of Allama Iqbal Medical College / Jinnah Hospital, Lahore; The prevalence of myopia came out to be 57.9%⁽²²⁾. Another study of 345 medical students in Taiwan showed that more than 90% of Taiwanese medical students were myopic⁽²³⁾.

As regard to family history, our study reported family history of error was 56.3% which include 23.4% from both mother and father, the same percent from father and 9.6% from mother and no family history of error was 43.7%. Another study reported 61% of those with myopia have a family history of myopia⁽¹⁴⁾. Another study conducted in Lahore by Chaudhry *et al.*⁽²²⁾ 60.7% had positive family history (myopia among first blood relations), whereas 18.8% myopics did not show any history. Another study reported 74.1% of those with RE had a family history of RE in any of the parent⁽²¹⁾. Another study reported Parental history of Res was 31.58%⁽²⁰⁾. In another study among 120 myopic students, parental history was noted in 31 students (25.8%); both parents myopic for 8(6.6%) students and single parent myopic for 23(19.1) students⁽¹⁹⁾.

Conclusion and recommendations

The prevalence of REs among investigated students was 67.1%, which is one of the highest rates reported. There has to be a concern for a regular checkup starting from early ages as a preventive measure against REs through increasing knowledge, concerning REs particular for medical students as future health care professionals.

Limitations of the study

The details of causes of errors of refraction could not be specified due lack of investigations. Large wide scale study is needed to find the details of the causes.

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